

**Title:** Soil Volume Reduction

**Need ID No:** NV-04-0002-05-S

**Date:** January 18, 2000

**Need/Opportunity Description:** A process is needed that will efficiently separate “clean” soil from contaminated soil. Fine particles of plutonium are the principal contaminant of interest.

**Need/Opportunity Category:** Science Need

**Operations/Field Office:** DOE/NV

**Site:** Nevada Test Site (NTS), Tonopah Test Range, Nellis Air Force Range

**End User Program:** Environmental Restoration Division (ERD)

**Priority Rankings:**

End User Program Ranking 1 of 1

ACPC Priority: 2

Site Wide Ranking: 2 of 13

**PBS Number/Title:** NV211/Soils

**WBS Number:** 1.4.1.2.1.1.03, 04, and 05

**Waste Stream:** LLW Soils (01026)

**Background:** Contaminated soils sites subject to corrective action are off the NTS, straddle the NTS, and within the NTS. The goals of the soils project are to perform the necessary corrective actions that permit alternative uses of the sites. The present technology being used for soil remediation is bulk packaging, transportation, and disposal. Excessive uncontaminated soil is handled along with the contaminated soil. This process could be modified in a way for less clean soil to be packaged, transported, and disposed.

**Baseline Technology/Process:** The current method used to deal with this material is to excavate using construction/earth moving equipment, then package and transport the contaminated soil to the disposal site.

**Cost:** The costs estimate for the next five soil remediation sites contained in the April 1999 Environmental Restoration Lifecycle Baseline is \$107 million in escalated dollars.

**How Long will it Take:** Between now and 2006.

**Issues Related to Baseline:**

**Technical:** Existing technology is not able to reduce the contamination in large volumes of soil. Current costs of packaging, transportation, and disposal are prohibitive.

**Cost:** The cost savings for 70 percent volume reduction for the next five sites is estimated to be on the order of \$20 million in present day dollars, based on predetermined corrective action levels.

**Regulatory:** Current contamination levels are above levels for unconditional release of land areas.

**Safety, Health, and the Environment:** The reduction in the volume of contaminated soils may reduce the risk of occupational exposure to disposal workers.

**Stakeholder and Cultural:** The transportation risk will be reduced, however, greater concentrations could be a Department of Transportation issue.

**Other:** None.

**Science Need Description:** A novel process is needed that will efficiently separate "Clean" soil from contaminated soil. The principal contaminant is fine particles of plutonium 239, dispersed in near-surface soils. Contaminant concentrations range from 200 pCi/g to 12,800 pCi/g. Previous evaluations of soil volume reduction technologies, the lack of detailed soil matrix characterization information was identified as a possible hindrance to their performance. For example, there is little published information on how the Pu is attached to mineral grains, what relationship there are between the matrix surface chemistry and the propensity for Pu particles to be attached, and how the oxidation state of the Pu varies. Fundamental research is required in the areas of chemical and physical separation. Studies that result in methods of water recovery and cleaning applied to soil washing technologies are of interest. Engineering studies associated with separation based on size and/or density are also encouraged.

**Functional Performance Requirements:** Significant soil volume reduction is required. A minimum of 70 percent soil volume reduction is needed. The clean soil should have a plutonium concentration of less than 1000 pCi/g. The resulting technology must be portable and operate effectively in remote arid locations to minimize hauling of soils and use of water. The resulting technology must be applicable and cost effective for processing 500,000 cu. ft. of soil with minimal downtime. The generation of secondary waste streams, mixed-waste, or transuranic waste is not desirable.

**Schedule Requirements:** The Federal Facility Agreement Consent Order and draft Accelerating Cleanup: Paths to Closure contemplate the efforts continuing through FY 2006.

**Consequences of Not Filling Need/Opportunity:** Expected budgets may not be sufficient of cover planned activities. In addition, there would be poor and inefficient utilization of existing, finite LLW waste disposal capacity.

**Contractor End User Point(s) of Contact:** Ed Hohman, Bechtel Nevada, Technical Support, Office: 702-295-3798, Fax: 702-295-1420, E-mail [hohmaneh@nv.doe.gov](mailto:hohmaneh@nv.doe.gov)

**DOE End User Point(s) of Contact:** Bill Wilborn, ERD, Technology Facilitator; Office: 702-295-3188, Fax: 702-295-1113, Email : [wilborn@nv.doe.gov](mailto:wilborn@nv.doe.gov)